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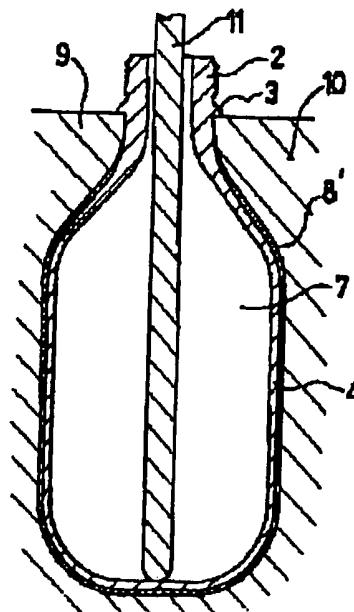
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TITLE : CONTAINER, PRODUCTION THEREOF
AND PREFORM



ABSTRACT : PURPOSE: To enhance gas barrier properties and to facilitate production by forming a resin film containing a polyvinyl alcohol type coating agent on the surface of a container composed of biodegradable plastic.

CONSTITUTION: The surface of the body part 4 of a preform is subjected to activation treatment so as to chemically adsorb a gas barrier resin. The treated surface of the preform is coated with a coating agent composed of a polyvinyl alcohol type coating agent. The coated preform is heated to stretchable temp. and the flange part 3 thereof is set between a pair of openable and closable molds 9, 10 and compressed air is supplied while the preform is stretched by a stretching rod 11 to mold a plastic bottle 7. The preform is expanded by stretching and blow to be molded into the blow bottle 7 and the molecules of the resin film of the preform are stretched, cooled and solidified to become a resin film 8' and the gas barrier properties and strength of the bottle are enhanced.

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CLAIMS

[Claim(s)]

- [Claim 1] The container characterized by forming the resin coat containing the coating agent of a polyvinyl alcohol system in the front face of the container which consists of a biodegradable plastic.
[Claim 2] The container with which said biodegradability plastics bottle is characterized by being one of the simple substances or complex of polylactic acid, aliphatic series polyester, hydroxy polyester, the poly caprolactone, or polyamino acid in the container of claim 1.
[Claim 3] The container which the hydrolyzate of a metal alkoxide or a metal alkoxide contains on said resin coat 5 % of the weight to 70% of the weight, and is characterized by the metal of said metal alkoxide being either silicon or aluminum in the container of claim 1 or claim 2.
[Claim 4] Preforming characterized by forming the resin coat with which it is preforming for fabricating the container of claim 1 thru/or claim 3, and the construction material consists of either polylactic acid, aliphatic series polyester, hydroxy polyester, a poly caprolactone or polyamino acid, and becomes a front face from the coating agent of a polyvinyl alcohol system at least.
[Claim 5] Preforming to which it is preforming of claim 4, and it contains 70% of the weight, and either a metal alkoxide or metal alkoxide hydrolyzate is characterized by 5 % of the weight thru/or the metal of said metal alkoxide being either silicon or aluminum at said resin coat.
[Claim 6] The manufacture approach of the container characterized by being the manufacture approach of the container which forms the container of claim 1 thru/or claim 3, coating the front face of said preforming with the coating agent of a polyvinyl alcohol system at least after carrying out activation of the front face of preforming containing either polylactic acid, aliphatic series polyester, hydroxy polyester, the poly caprolactone or polyamino acid, and arranging and carrying out drawing blow molding of this preforming to the cavity of heating backward metal mold.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is excellent in gas barrier nature, such as an oxygen barrier, carbon-dioxide barrier nature, and odor barrier nature, and relates to the container disassembled automatically and its manufacture approach.

[0002]

[Description of the Prior Art] Recently, since a plastic envelope is excellent in a lightweight thing and shock resistance compared with glass etc., it is used for various containers.

[0003] Especially the bottle made from polyester by the drawing blow molding method especially polyethylene terephthalate (PET) and the bottle made from polyolefine, especially the bottle made from polypropylene (pp) are widely used as containers, such as drinks including a carbonated drink, a seasoning, cosmetics, and liquid detergent, from the outstanding physical properties (transparency, glossiness, lightweight nature, moderate rigidity, etc.).

[0004]

[Problem(s) to be Solved by the Invention] However, since it is hard to corrode, when such a product made from polyethylene terephthalate or the drawing blow bottle made from polypropylene is scattered about and left as dust, there is a problem of being easy to cause environmental pollution in natural environment etc. Although the plastics which tend to be decomposed by the microorganism etc. is studied by the end of today in order to cancel such a thing, such a biodegradable plastic is inferior to the gas barrier nature of oxygen barrier nature, carbon-dioxide barrier nature, odor barrier nature, etc., and has the problem that the shelf life of contents is not good.

[0005] In order to improve such a point, there is also the approach of carrying out the lap of the film which is excellent in gas barrier nature, such as ethylene acetic-acid vinyl alcohol (EVOH) and nylon (Ny). Such an approach had the problem which a machine complicates, the problem to which the range of a process condition becomes narrow, the problem to which cost becomes high.

[0006] that by which this invention was made paying attention to such a problem -- it is -- biodegradability -- it is -- in addition -- and it excels in gas barrier nature, and manufacture is still easier and cost is also aimed at providing the manufacture approach list of a low container and a container with preforming.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the container concerning claim 1 of this invention is characterized by forming the resin coat containing the coating agent of a polyvinyl alcohol system in the front face of the container which consists of a biodegradable plastic.

[0008] Moreover, the container of claim 2 of this invention is characterized by said biodegradable plastic containing either polylactic acid, aliphatic series polyester, hydroxy polyester, the poly caprolactone or polyamino acid in the container of claim 1.

[0009] Furthermore, in the container of claim 1 or claim 2, on said resin coat, the hydrolyzate of a metal

alkoxide or a metal alkoxide contains the container of claim 3 of this invention 5 % of the weight to 70% of the weight, and it is characterized by the metal of said metal alkoxide containing either silicon or aluminum.

[0010] Preforming of claim 4 of this invention is preforming for fabricating the container of claim 1 thru/or claim 3, and is characterized by forming the resin coat with which the construction material consists of either polylactic acid, aliphatic series polyester, hydroxy polyester, a poly caprolactone or polyamino acid, and becomes a front face from a polyvinyl alcohol system coating agent.

[0011] Preforming of claim 5 of this invention is preforming of claim 4, it contains 70% of the weight, and either a metal alkoxide or metal alkoxide hydrolyzate is characterized by 5 % of the weight thru/or the metal of said metal alkoxide containing either silicon or aluminum at said resin coat.

[0012] The manufacture approach of the container of claim 6 of this invention is the manufacture approach of the container which forms the container of claim 1 thru/or claim 3. Either polylactic acid, aliphatic series polyester, hydroxy polyester, the poly caprolactone or polyamino acid After carrying out activation of the front face of included preforming, the front face of said preforming is coated with the resin containing a polyvinyl alcohol system coating agent at least, and it is characterized by arranging and carrying out drawing blow molding of this preforming to the cavity of heating backward metal mold.

[0013]

[Function] Since according to the container of claim 1 of this invention, and claim 2 a container is formed by biodegradable plastics, such as polylactic acid, fatty-acid polyester, hydroxy polyester, the poly caprolactone, or polyamino acid, coating of the coating agent of a polyvinyl alcohol system is carried out to the front face and it forms the resin coat in it, while gas barrier nature improves, if it is left in the outdoors after an activity and gets wet for waterdrop etc., swelling and elution of will be done and biodegradation will be carried out soon.

[0014] According to the container of claim 3 of this invention, since a metal alkoxide or metal alkoxide hydrolyzate is contained in the resin coat in 5 % of the weight thru/or 70% of the weight of the range in addition to the operation of the container of claims 1 and 2, compared with the case where it is not contained, gas barrier nature improves further.

[0015] Since a surface coating agent will be extended, and will carry out orientation crystallization and the clearance between resin will be narrowed while a biodegradable plastic is extended and a container is formed if drawing blow molding of the preforming is set and carried out [according to preforming of claim 4 of this invention] to metal mold in addition to an operation of the container of claims 1 and 2, gas barrier nature improves. And according to preforming of claim 5, since a metal alkoxide or metal alkoxide hydrolyzate is included, gas barrier nature improves further.

[0016] Although according to the manufacture approach of the container of claim 6 of this invention there is little manufacture time and effort of a container, there is little production time compared with a lamination method etc. and a production cost is low, the container which has sufficient gas barrier nature can be obtained, and moreover, even if dispersion neglect is carried out in the outdoors after an activity etc., it biodegrades and disappears, and environmental contamination can be prevented.

[0017]

[Example] Hereafter, the resin coating container concerning the example of this invention and its manufacture approach are explained based on a drawing.

[0018] The cross-section configuration of preforming in connection with the example of this invention is shown in drawing 1.

[0019] This preforming 1 by holding and carrying out a drawing blow into the metal mold of the couple opened and closed In order to play the role of the screw section 2 which forms a plastics bottle and projects on the outside of metal mold from the edge by the side of air entrainment opening of the metal mold upper part, and the preforming support at the time of drawing shaping It consists of a flange 3 supported by the edge by the side of air entrainment opening of metal mold, and a closed-end cylindrical drum section 4 in which a biaxial drawing is carried out by the entrainment of a compressed air and which swells in a plastics bottle configuration. The resin coat 5 excellent in gas barrier nature is formed

in the front face (this example front face of the outside of a cylinder part) of the drum section 4 of plastics 1. In addition, the metal mold used for drawing blow molding is the same as the metal mold of the common knowledge which carries out drawing blow molding of the usual preforming.

[0020] the high molecular compound in which drawing blow molding is possible for the construction material of preforming 1, and the so-called biodegradation biochemically decomposed by the microorganism is possible -- it is -- ****ing -- concrete -- a drawing -- a certain proper polylactic acid,

aliphatic series polyester, hydroxy polyester, the poly caprolactone, polyamino acid, etc. are mentioned.

[0021] As polylactic acid, the polylactic acid of a copolymer with a tartaric acid, a glycolic acid, alpha-malic acid, a polyethylene glycol, lactone, etc. is sufficient.

[0022] As aliphatic series polyester, the aliphatic series polyester by which a polycondensation is carried out to dicarboxylic acid, such as an adipic acid, succinic acid, and oxalic acid, from glycols, such as ethylene glycol, propylene glycol, and butanediol, is sufficient.

[0023] Moreover, as hydroxy polyester, a 3-hydroxy butyrate 3-hydroxy BARRETO copolymer is desirable.

[0024] In addition, a well-known additive, for example, an ultraviolet ray absorbent, a plasticizer, a coloring agent, a crystalline-nucleus agent, an antistatic agent, etc. may be included in these plastics. Such combination is sufficient although the approach of fabricating preforming 1 has the direct-blow-molding approach, the injection-molding approach, the injection-blow-molding approach, the extrusion-molding approach, the vacuum-forming approach, compression molding, or machining.

[0025] When forming the resin coat 5 of gas barrier nature in preforming 1, activation is performed so that the resin of gas barrier nature may chemisorb on the front face of the drum section 4 of the shape of a closed-end cylindrical shape of the fabricated preforming 1. The approach of this activation has the corona treatment by corona discharge, ozonization, etc. besides the frame processing which applies Flame F as shown in drawing 2. A flame is applied at the time of frame processing of this preforming 1, rotating preforming 1 centering on the center line extended in the direction of the same axle. The perimeter part of the drum section 4 of preforming 1 is activated by this.

[0026] After the activation of preforming 1, as shown in drawing 3, it is immersed in the cistern 6 into which the coating agent 5 went preforming 1, and a coating agent 5 is applied to the front face of preforming 1. The coating approach of a coating agent 5 has immersion, blasting, brush coating, etc.

[0027] As a coating agent 5 for forming a resin coat (referring to drawing 4), coating agents which carry out decomposition runoff easily, such as microorganism--decomposition and hydrolysis, are desirable, and there is a polyvinyl alcohol system coating agent (PVA). These coating agents 5 make drawing blow molding possible after coating, and oxygen barrier nature, carbon-dioxide barrier nature, and its odor barrier nature improve.

[0028] The hydrolyzate of the alkoxide contained in a coating agent or an alkoxide carries out concentration content of these coating agents 5 including an alkoxide or alkoxide hydrolyzate 5-% of the weight concentration - 70% of the weight.

[0029] The alkoxide to contain can express tetraethyl orthochromatic silicate ($\text{Si}_4(\text{OC}_2\text{H}_5)$), triisopropyl aluminum, etc. with general formula (aluminum $3(\text{OC}_3\text{H}_7)$) M(OR) n (M is metals, such as Si, aluminum, and Zr, and R is an alkyl group). Especially, Si is excellent in Metal M and aluminum is excellent in the property of an alkoxide.

[0030] Although the addition of an alkoxide or alkoxide hydrolyzate changes with classes of draw magnification and coating agent to apply etc. and does not generally have ***** and others, from the homogeneous point of coating coat 8' of the blow bottle 7 obtained after shaping, it is desirable, and is 40% or less more preferably. [70% or less of] Moreover, although what % is sufficient as a minimum since the gas barrier nature of a blow bottle improves only by adding the alkoxide or alkoxide hydrolyzate of a small amount, although based also on the thickness of coating coat 8' to form, it is 5% or more more preferably.

[0031] Although PVA will be swollen if moisture is absorbed, and gas barrier nature falls, the coating agent 5 is beforehand applied to preforming 1, by cooling preforming 1 to a drawing blow pan, an orientation crystal is carried out and lowering of gas barrier nature is suppressed.

[0032] In addition, there is also a polyvinyl alcohol system coating agent (following, PVA) which does not contain an alkoxide among the coating agents 5. Activation is performed to extent with which preforming 1 front face can be coated also by the coating agent which does not contain an alkoxide.

[0033] Although a coating agent 5 may be coated with a coating agent independent since it is excellent in gas barrier nature, such as oxygen barrier nature, carbon-dioxide barrier nature, and odor barrier nature, made it more desirable to contain an alkoxide or alkoxide hydrolyzate.

[0034] The preforming 1 which coated the coating agent 5 raises the skin temperature of the drum section 4 of preforming 1 to 100-degreeC-150-degreeC, heating the preforming 1 which applied the coating agent and drying a coating agent with the infrared radiation at an infrared heater, or heating in oven, first, before a drawing blow. Preforming 1 is gradually cooled after the temperature up of preforming 1. When the construction material of preforming 1 is polylactic acid, it cools to 60-degreeC-100-degreeC, and cooling to 70-degreeC-130-degreeC, when the construction material of preforming 1 is aliphatic series polyester etc. carries out temperature lowering to the drawing temperature of each resin, and the temperature distribution of the drum section 4 of preforming 1 are made into homogeneity.

[0035] Setting the preforming 1 which carried out temperature up to the temperature which can be extended between the metal mold 9 of the couple which can open and close a flange 3, and 10, and extending it with the drawing rod 11, it supplies a compressed air from the air nozzle which is not illustrated, and fabricates a plastics bottle.

[0036] The pressure and speed of the drawing rod 11 are usually moved at the pressure of 3 - 20 Kgf-cm⁻², and the speed of 2 - 50 cm/s, although it is dependent also on the configuration of the preforming 1 made to extend, and the configuration of the last mold goods.

[0037] A compressed air sets up primary blow pressure and secondary blow pressure, and primary blow pressure makes 1 - 10 Kgf-cm⁻² and secondary blow pressure an about -two 10 - 40 kg-cm pressure. In addition, it is not necessary to necessarily divide primary blow pressure and secondary blow pressure, they can also perform drawing blow molding by the single pressure, and do not limit the shaping approach.

[0038] Drawing 5 shows the plastics bottle 7 obtained by carrying out drawing blow molding of the preforming 1 of this example. As for the plastics bottle 7, resin coat 8' is formed in the outside peripheral surface. The resin coat 8 with which coating of this resin coat 8' was carried out with preforming 1 at the time of the drawing blow of preforming 1 is extended.

[0039] The molecule of the resin coat 8 of preforming 1 carries out an orientation crystal by drawing, while preforming 1 swells and the blow bottle 7 is fabricated by a drawing and blow, the clearance between resin coat 8' becomes small, resin coat 8' carries out cooling solidification, and while gas barrier nature improves, reinforcement improves. Furthermore, since preforming 1 is coated beforehand, a coating tooth space is also small, ends and can promote miniaturization of a machine.

[0040] Polyvinyl alcohol PVA is disassembled, even if a container becomes unnecessary and is discarded out of doors etc., in order to hydrolyze easily. Also naturally, a metal alkoxide or metal alkoxide hydrolyzate when PVA decomposes exists as a metallic oxide (general formulas MnOm and M are metals), and when a container becomes unnecessary, even if it is discarded and left and is absorbed in the earth out of doors, it does not have worries about environmental pollution.

[0041] In addition, after carrying out drawing blow molding of the preforming 1 of non-coating and considering as a plastics bottle, performing and carrying out coating processing of the frame processing etc. is also considered. A coating resin coat is possible also when carrying out to inside front faces, such as a plastics bottle or a tray, and a cup.

[0042] Furthermore, the hot parison method and a cold parison process are also considered by the manufacture approach which coats a coating agent 5 after blow bottle formation. Furthermore, although the drawing blow molding approach was explained as an example of the manufacture approach of a container, the manufacture approach of the container of this invention is not limited, surface preparation of the container obtained by the plastic working approaches, such as the direct-blown-molding approach used as shaping of plastics, the injection-molding approach, the injection shaping approach, the

extrusion-molding approach, and the vacuum-forming approach, may be carried out, and it may be coated with the above-mentioned example.

[0043] What combined what polylactic acid, aliphatic series polyester, hydroxy polyester, the poly caprolactone, polyamino acid, etc. were mentioned, and used these independently, for example as construction material of the container made to fabricate by the direct-blown-molding approach, the injection-molding approach, the injection-blown-molding approach, the extrusion-molding approach, the vacuum-forming approach, etc. may be used. An additive, for example, an ultraviolet ray absorbent, a plasticizer, lubricant, a coloring agent, a crystalline-nucleus agent, an antistatic agent, etc. may be included in these plastics. As hydroxy polyester, a 3-hydroxy butyrate 3 hydroxy BARIETO copolymer is desirable.

[0044] In addition, as a thing of the container which raises gas barrier nature, and others, a plastic sheet, a plastic film, a plastics panel, etc. are considered other than containers, such as a plastics bottle, a plastics tank, a plastic tube, a plastics box, a plastics case, and plastics bag-making.

[0045] Next, the example of an experiment of the resin coating container of this invention is explained below.

[0046]

[The example 1 of an experiment] in the example 1 of an experiment, injection molding of the polylactic acid with which glass transition point temperature consists of 56.3-degreeC, the crystallization temperature C of 107.8 degrees, the melting point C of 160.3 degrees, and weight average molecular weight / number-average-molecular-weight (M_w/M_n) = 2.4 was carried out with cylinder temperature C of 200 degrees, and the die temperature C of 15 degrees, and the diameter of 30mm and a drum section 4 obtained [the diameter of a flange 3] 27.4mm, drum section die length of 120mm, and 15g preforming (closed-end parison).

[0047] Frame processing of this preforming was carried out, whenever [wetting] was made into 58 dynes, 40g of solution of hydrochloric acid of PH=2 was added to tetraethyl orthochromatic silicate ($Si_4(OC_2H_5)_8$.3g), it hydrolyzed and SiO_2 solution of 5% of solid content was obtained. It mixed so that it might be set to $SiO_2/PVA=1/1$ to this by 5% water-solution weight ratio of polyvinyl alcohol PVA.

[0048] Reheat this SiO_2/PVA coating preforming, and it is referred to as 110-degreeC (reheating temperature), and cools gradually. Preforming temperature To homogeneity, 90-degreeC It considers as (drawing temperature) and 5 Kgf-cm-23s and a secondary blow carry out [drawing rod pressure 7 kgf-cm-20.5s and a primary blow] drawing blow molding in 15 Kgf-cm-23s. 1.3 times as many vertical draw magnification as this, the horizontal draw magnification of 2.6 times, bottle height of 150mm, The polylactic acid blow bottle of 300ml SiO_2/PVA coating with a diameter of 65mm was obtained.

[0049] Thus, the obtained blow bottle had the transparent appearance, and the coating agent's was uniform, and it became a container with a thickness of 0.6mm. When this blow bottle was buried in six-month soil insulation, reinforcement fell remarkably and this blow bottle did not have the force of holding a configuration. The plastics bottle left in air did not have appearance change. The result of having measured the oxygen transmittance of this plastics bottle is shown in a table 1.

[0050]

[The example 2 of an experiment] In the example 2 of an experiment, the same preforming as the example 1 of an experiment was used. Coating processing was not performed to this preforming, but drawing blow molding was performed, and the drawing blow container which does not carry out coating processing was obtained. Frame processing was performed in this blow bottle, 60 dynes cost whenever [wetting], it dipped in the $2O_3/PVA$ coating agent of aluminum which has aluminum 15%, and the polylactic acid blow bottle of $2O_3/PVA$ coating of aluminum was obtained. When this blow bottle was buried in six-month soil insulation, reinforcement fell remarkably and this blow bottle did not have the force of holding a configuration. There was no appearance change of the plastics bottle left in air. The result of having measured the oxygen transmittance of this blow bottle is shown in a table 1.

[0051]

[The example 3 of an experiment] In the example 3 of an experiment, injection molding of the aliphatic series polyester which consists of the dicarboxylic acid and the glycol of weight average molecular

weight / number-average-molecular-weight (M_w/M_n) = 3, difference = 30.4-degreeC (melting out temperature = 93.8-degreeC, recrystallization temperature = 63.4-degreeC) of a melting out temperature and recrystallization temperature, and heat-of-fusion = 35.9 J/g was carried out, and preforming (closed-end parison) with 2.0mm [in a flange of with a diameter of 30mm, a drum section with a diameter of 28mm, die length of 100mm, and thickness] and a weight of 10g be obtained.

[0052] Frame processing of this preforming was carried out, 57 dynes cost whenever [wetting], it was immersed in the PVA coating agent, and PVA coating preforming was obtained.

[0053] This PVA coating preforming was reheated and it was referred to as 94-degreeC (drawing temperature), and 3.3 Kgf-cm-22s and a secondary blow carried out drawing blow molding in 30 Kgf-cm-25s, and drawing rod pressure 7 kgf-cm-20.5s and a primary blow obtained the aliphatic series polyester blow bottle of 350ml polyvinyl alcohol coating with 1.4 times as many vertical draw magnification as this, the horizontal draw magnification of 2.2 times, a bottle height [of 140mm], and a diameter of 62mm.

[0054] Thus, the obtained blow bottle had the transparent appearance, and the coating agent's was uniform, and it became a container with a thickness of 0.5mm. When this blow bottle was buried in six-month soil insulation, reinforcement fell remarkably and this blow bottle did not have the force of holding a configuration. The plastics bottle left in air did not have appearance change. The result of having measured the oxygen transmittance of this plastics bottle is shown in a table 1.

[0055]

[The example 4 of an experiment] In the example 4 of an experiment, the copolymer of 3 hydroxy butyrate 3 hydroxy BARIRETO was injection molded with cylinder temperature C of 140 degrees, and the die temperature C of 60 degrees, and height of 100mm, 40mm of diameters of a container, and a cup with a thickness of 0.2mm were obtained. Frame processing of this cup was carried out, 54 dynes cost whenever [wetting], it was immersed in the ZnO/PVA coating agent containing aluminum 30% of aluminum, and the ZnO/PVA coating cup of aluminum was obtained. Thus, the coating layer of the obtained cup was also uniform, and the appearance was transparent. When this cup was buried in six-month soil insulation, reinforcement fell remarkably and there was no force of holding a configuration. The cup left in air did not have appearance change. The result of having measured the oxygen transmittance of this cup is shown in a table 1.

[0056]

[The example 5 of an experiment] In the example 5 of an experiment, direct blow molding of the copolymer of 3 hydroxy butyrate 3 hydroxy BARIRETO was carried out with cylinder temperature C of 140 degrees, and the die temperature C of 60 degrees, and the blow bottle with bottle height of 190mm, 75mm of diameters of a bottle, the capacity of 650ml, a weight [of 20g], and a thickness of 0.3mm was obtained.

[0057] Frame processing of this blow bottle was carried out, 60 dynes cost whenever [wetting], it was immersed in the SiO_2/PVA coating agent which contains Silicon Si 60%, and the SiO_2/PVA coating blow bottle was obtained. When this blow bottle was buried in six-month soil insulation, reinforcement fell remarkably and there was no force of holding a configuration. The cup left in air did not have appearance change. The result of having measured the oxygen transmittance of this cup is shown in a table 1.

[0058]

[The example 1 of a comparison] Next, coating processing was not performed for the same preforming as the example 1 of an experiment, but drawing blow molding was performed, and the drawing blow bottle of the same non-coating processing as the example 1 of an experiment was obtained. The result of having measured the oxygen transmittance of this blow bottle is shown in a table 1.

[0059]

[The example 2 of a comparison] Next, coating processing was not performed for the same preforming as the example 3 of an experiment, but drawing blow molding was performed, and the drawing blow bottle of the same non-coating processing as the example 3 of an experiment was obtained as an example 2 of a comparison. The oxygen transmittance result of the blow bottle of the example 2 of a

comparison is shown in a table 1.

[0060]

[The example 3 of a comparison] A drawing blow is carried out and carried out, frame processing of the coating processing is carried out, it wets wet, the same preforming as the example 2 of a comparison is made into 57 dynes of degree, it is immersed in a PVA coating agent, and the PVA coating blow bottle of initial oxygen transmittance is obtained like the example 1 of an experiment.

[0061]

[The example 4 of a comparison] Furthermore, in the example 4 of a comparison, coating processing was not performed using the cup obtained with injection molding of the example 4 of an experiment. The result of having measured the oxygen transmittance of this example 4 of a comparison is shown in a table 1.

[0062]

[The example 5 of a comparison] Moreover, coating processing was not performed as an example 5 of a comparison using the bottle obtained by the direct blow molding of the example 5 of an experiment. The result of having measured the oxygen transmittance of this container is shown in a table 1.

[0063]

[A table 1]

The first stage 1 previous month Bottle construction material Capacity (l) Coating agent Metal concentration Oxygen transmittance Example 1 of an oxygen transmittance experiment Polylactic acid 0.3 SiO₂/PVA 50% 0.3 Example 2 of an experiment Polylactic acid 0.3 SiO₂/PVA 5 0.4 Example 1 of a comparison Polylactic acid 0.3 0.8 Example 3 of an experiment Aliphatic series polyester 0.3 PVA 0 0.6 0.6 Example 2 of a comparison Aliphatic series polyester 0.35 1.1 Example 3 of a comparison Aliphatic series polyester 0.35 PVA 0 0.6 0.9 Example 4 of an experiment Hydroxy polyester 0.4 aluminum2O3/PVA 30 0.5 Example 4 of a comparison Hydroxy polyester 0.4 1.2 Example 5 of an experiment Hydroxy polyester 0.65 SiO₂/PVA 60 0.7 Example 5 of a comparison Hydroxy polyester 0.65 1.8 (for the unit of oxygen transmittance, ml/pkg-day and 1 previous-month oxygen transmittance are 40-degreeC the case where it saves at 65% of humidity is shown)

Since the resin coat of a coating agent is formed in the front face of the biodegradable plastic, while construction material is the biodegradable plastic decomposed by the microorganism, and gas barrier nature of the container of this example improves, biodegrading on the ground etc., even if left and scattered about, and polluting an environment is prevented. Since gas molecular size is mostly approximated while the molecule clearance between resin becomes narrow, it crystallizes and gas barrier nature improves since not only preforming but the resin coat of a coating agent is extended in extending preforming which coated the coating agent especially and forming a container, gas barrier nature, such as oxygen barrier nature, carbon-dioxide barrier nature, and odor barrier nature, improves. When an alkoxide or alkoxide hydrolyzate is contained during a crystal, gas barrier nature improves further by the goodness of metaled gas barrier nature. Moreover, since the drawing blow of the preforming 1 which coated the resin coat of gas barrier nature beforehand is carried out according to the preforming 1 of this example, and the manufacture approach of a blow bottle, although there is little manufacture time and effort of a blow bottle, there is little production time compared with a lamination method etc. and a production cost is low, the container which has sufficient gas barrier nature can be obtained.

[0064]

[Effect of the Invention] Since according to the container of claim 1 of this invention, and claim 2 a container is formed by biodegradable plastics, such as polylactic acid or fatty-acid polyester, coating of the coating agent of a polyvinyl alcohol system is carried out to the front face and it forms the resin coat in it, while gas barrier nature improves, if it is left in the outdoors after an activity and gets wet for waterdrop etc., swelling and elution of will be done and biodegradation will be carried out soon.

[0065] According to the container of claim 3 of this invention, since a metal alkoxide or metal alkoxide hydrolyzate is contained in the resin coat in 5 % of the weight thru/or 70% of the weight of the range in addition to the operation of the container of claims 1 and 2, compared with the case where it is not contained, gas barrier nature improves further.

[0066] Since a surface coating agent is extended and carries out orientation, and the clearance between resin will be narrowed and will crystallize while a biodegradable plastic is extended and a container is formed if drawing blow molding of the preforming is set and carried out [according to preforming of claim 4 of this invention] to metal mold in addition to an operation of the container of claims 1 and 2, gas barrier nature improves. And according to preforming of claim 5, since a metal alkoxide or metal alkoxide hydrolyzate is included, gas barrier nature improves further.

[0067] Although according to the manufacture approach of the container of claim 6 of this invention there is little manufacture time and effort of a container, there is little production time compared with a lamination method etc. and a production cost is low, the container which has sufficient gas barrier nature can be obtained, and moreover, even if dispersion neglect is carried out in the outdoors after an activity etc., it biodegrades and disappears, and environmental contamination can be prevented.

[Translation done.]